

Tagging jets in HF at L1

remind you old result :

- ❑ size of HF jet window and pile-up jet rejection v.s. efficiency

something new :

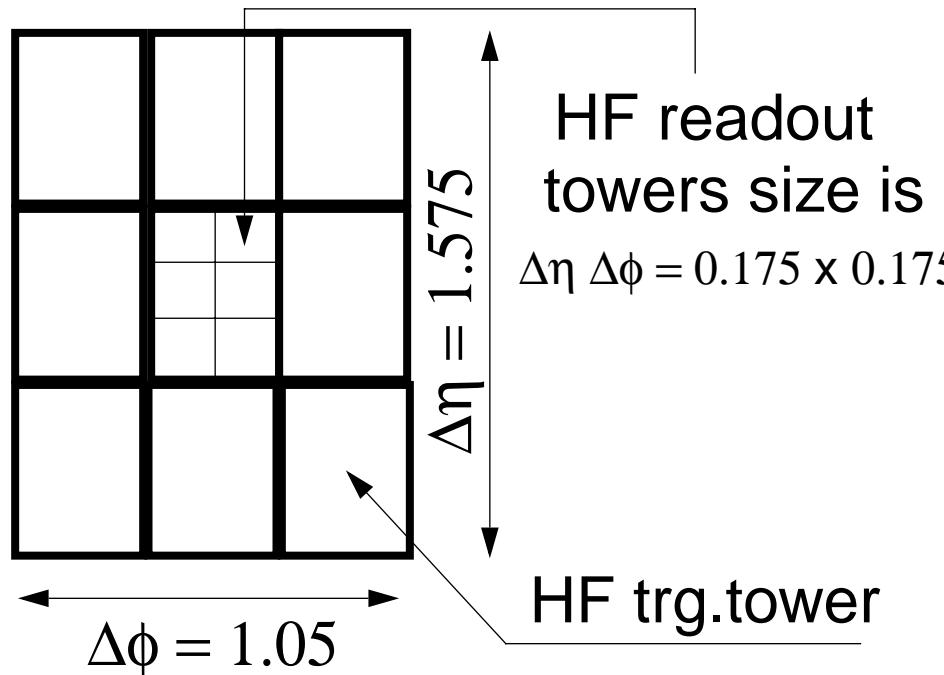
- ❑ can L1 jet shape help against “pile up jets” in 3x2 or 2x2 scheme ?
- ❑ do we need lower cut on off-line tagging jets ?
- ❑ HF contribution to L1 triggering on invisible Higgs
- ❑ L1 resolution for tag. jets vs size of HF Jet window

L1 HF Jet Window

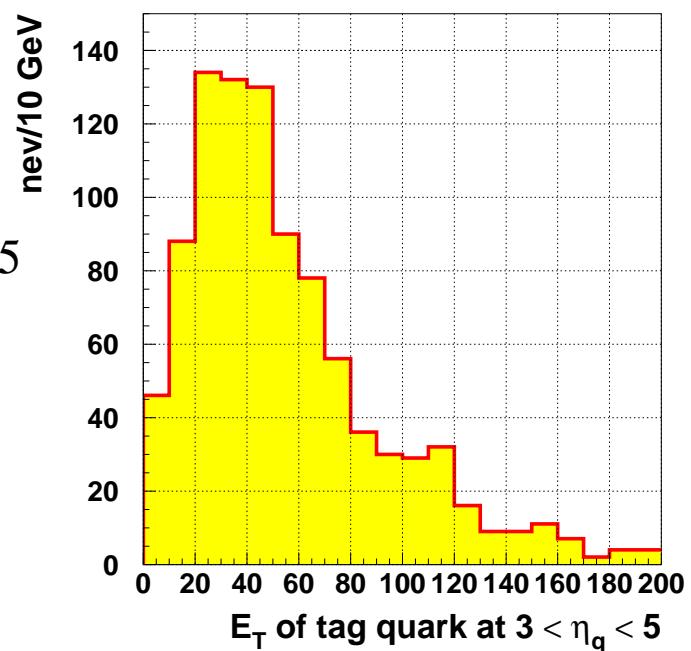
Present scheme :

HF L1 Jet Window is
3x3 HF trigger towers

HF trigger tower is 3x2
HF readout towers



What is optimal Jet Window size to trigger on tagging jets in HF ?



Size of HF Jet Window and pile-up jet rejection v.s. efficiency

Jet Window is 3x3 trigger towers. Try 3 sizes of HF trigger tower :

size of HF trigger tower $N_\eta \times N_\phi$ off line HF towers	Jet Window size, $\Delta\eta \times \Delta\phi$
1 x 1	0.525 x 0.525
2 x 2	1.050 x 1.050
3 x 2	1.575 x 1.050

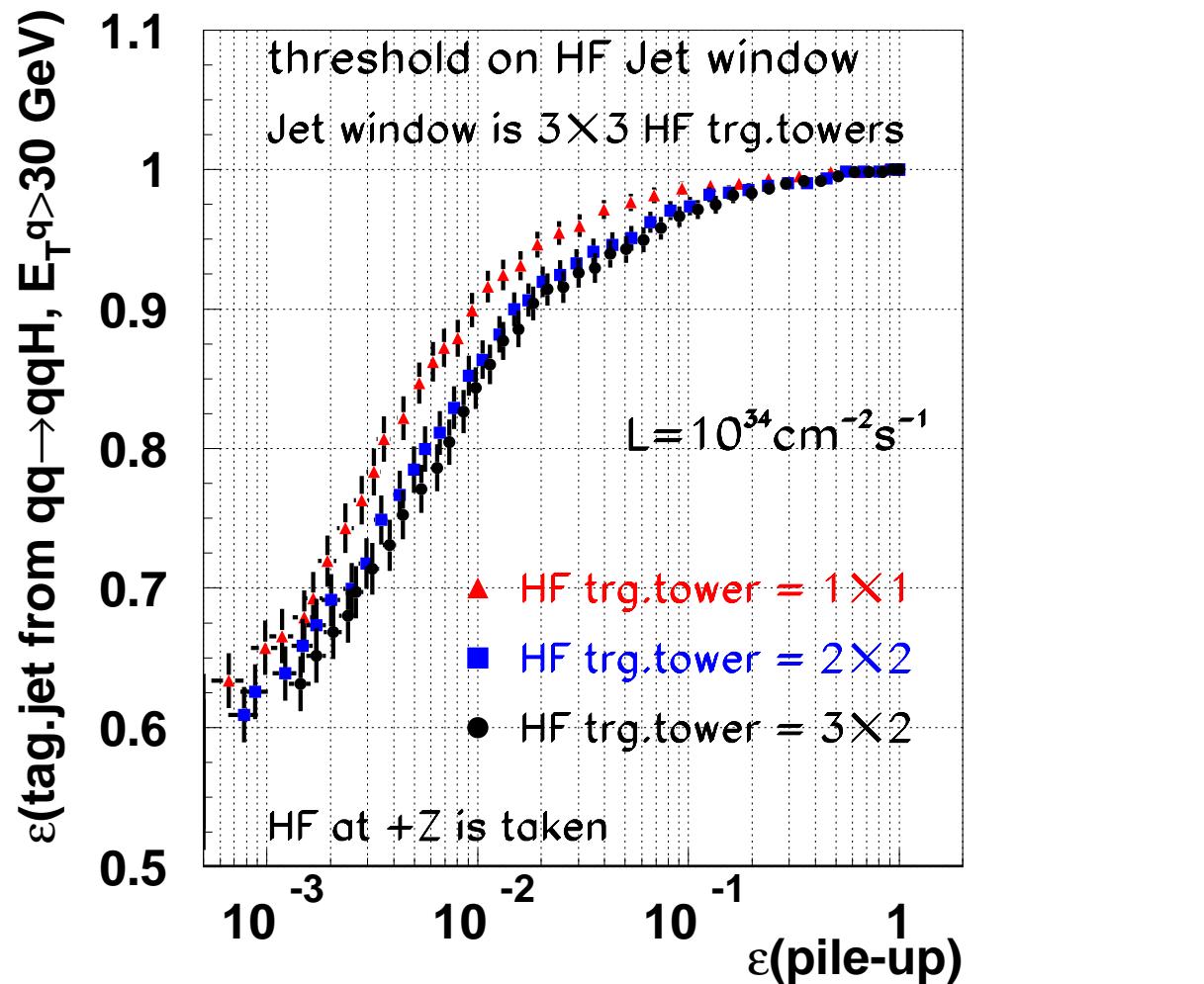
- 1 x 1 is the best
- 2 x 2 = 3 x 2

Threshold for suppression 100 (no corr.)

18 GeV for 1x1

25 GeV for 2x2

28 GeV for 3x2

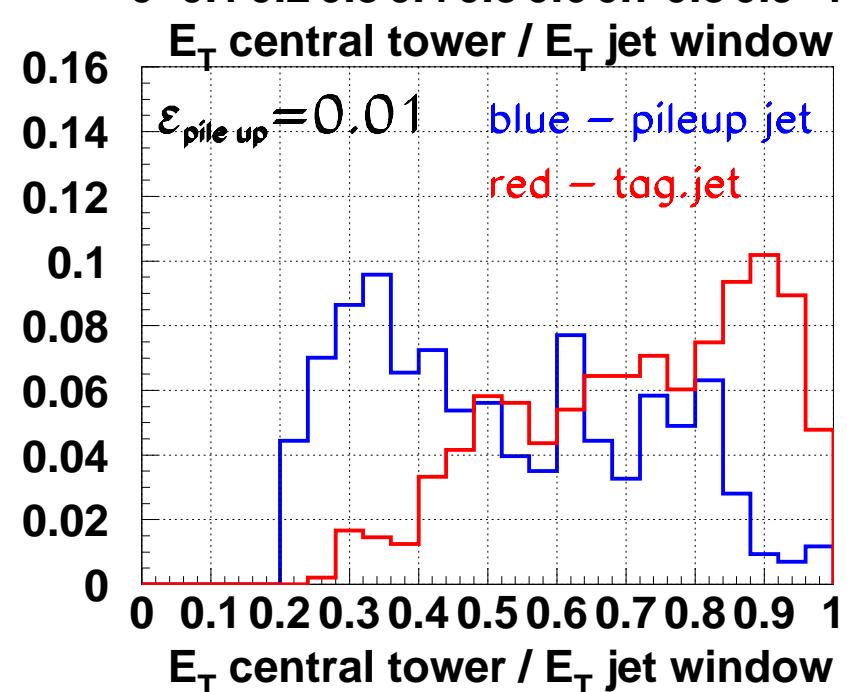
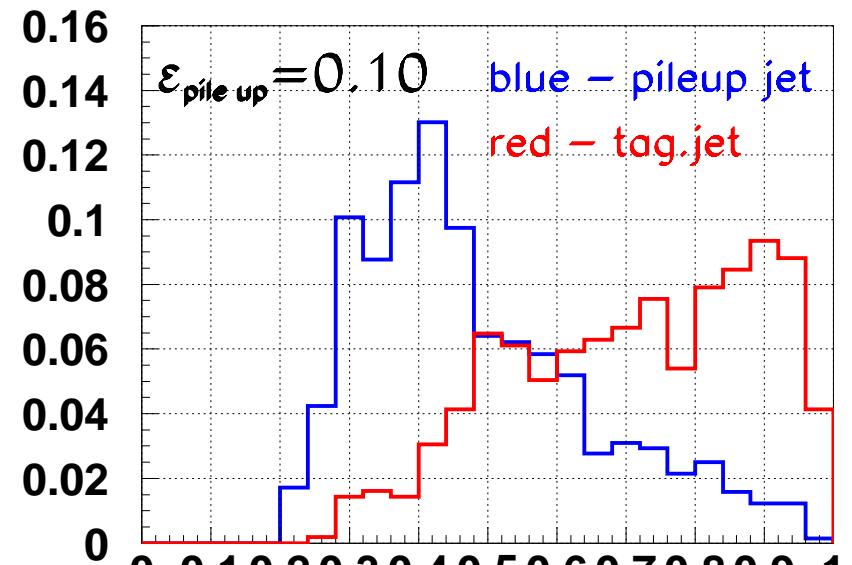
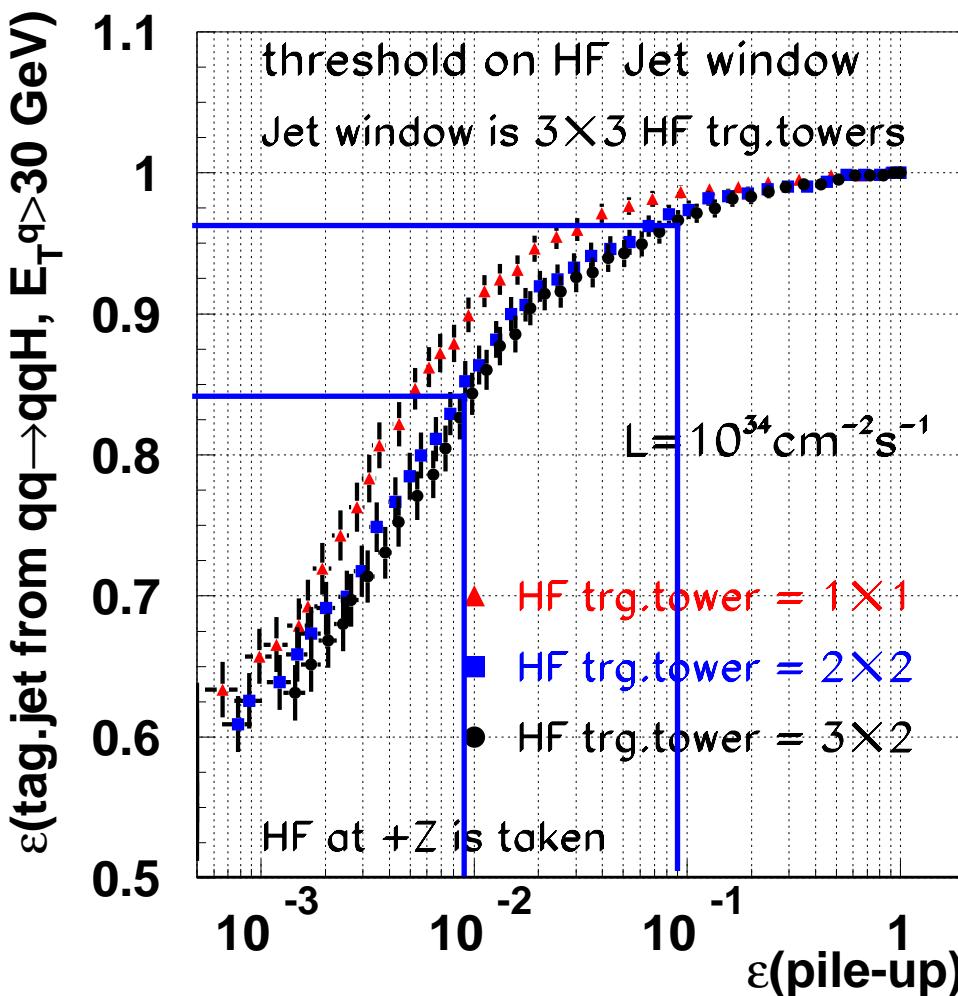


staying with 3x2 can we reduce rate (at the same efficiency) using L1 jet shape :

$$S = E_T \text{ central tower} / E_T \text{ jet} ?$$

Can we reduce rate with cut on $S = E_T$ central tower / E_T jet in 3x2 scheme ?

1. Yes, it's possible, but by the price of efficiency; the same we can do just simply increasing threshold on jet.
2. At high threshold we start to see "real" jets, so shape doesn't help



does lower cut on E_T^{Jet} provide a big gain ? case of qq->qqH, H->invisible

change of cut on $E_T^{tag,jets}$ after WBF cuts : $|\eta_{j1} - \eta_{j2}| > 4.4$, $\eta_{j1} \eta_{j2} < 0$,
 $M_{jj} > 1.2 \text{ TeV}$, $E_T^{\text{miss}} > 100 \text{ GeV}$

□ Cross-section after all selections vs cut on E_T of off-line tagging jet

cut on E_T of two tag.jets, GeV	25	30	35	40	45	50
cross section, fb	92.0	86.5	81.0	74.7	63.9	54.8

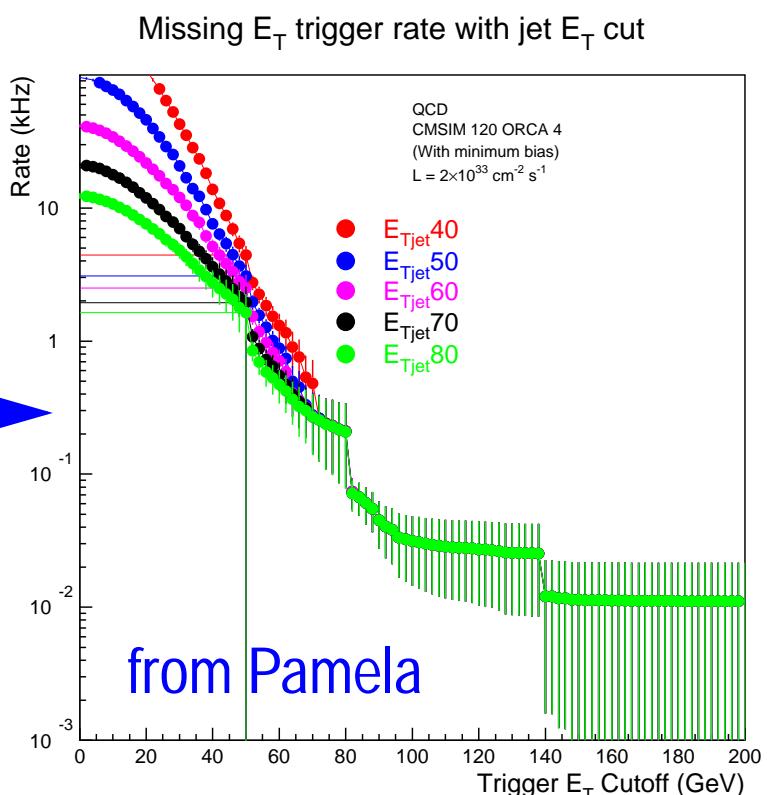
increase of ~14 % when reduce cut from 40 to 30 GeV

□ HF acceptance for tag.jets of $E_T > 30 \text{ GeV}$

	no jets in HF	one jet in HF	2 jets in HF
acceptance, %	22	65	13

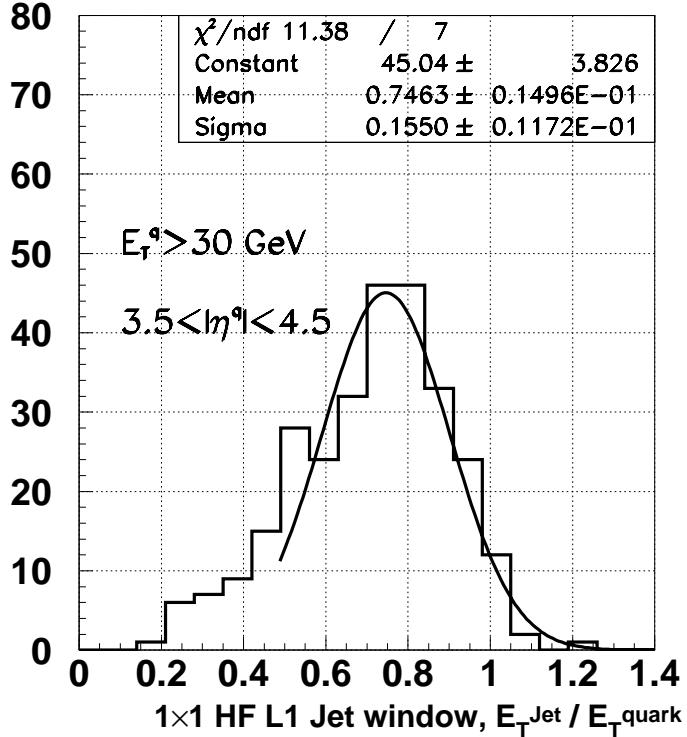
□ L1 Jet & MET combined trigger 70 & 70 GeV →
efficiency for events passed off-line cuts

	Jet trigger is included in HF	Jet trigger is not included in HF
efficiency, %	96.0	86.0



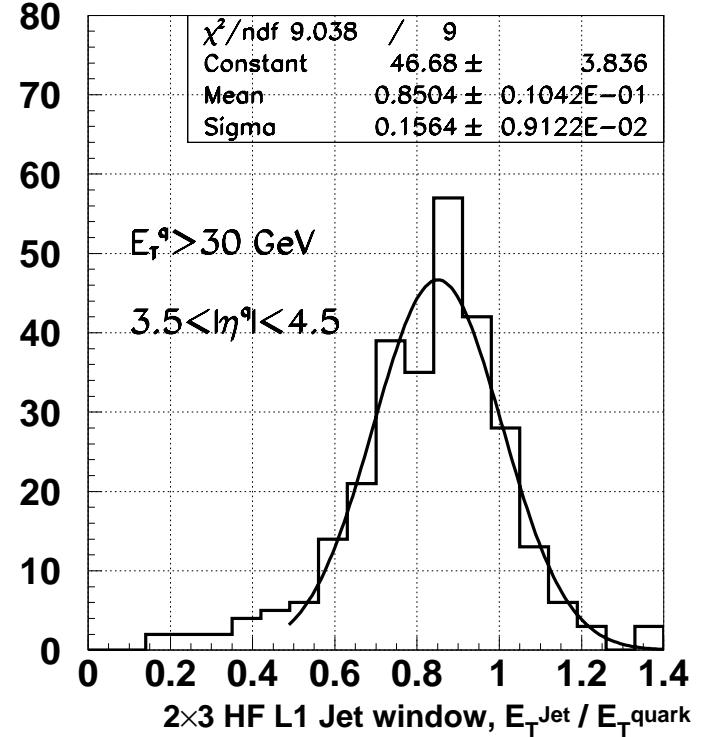
L1 efficiency is almost the same for $E_T^{tag,jet} > 30$ or 40 GeV

L1 resolution for tag. jets vs size of HF Jet window. E_T of tag. quark > 30 GeV

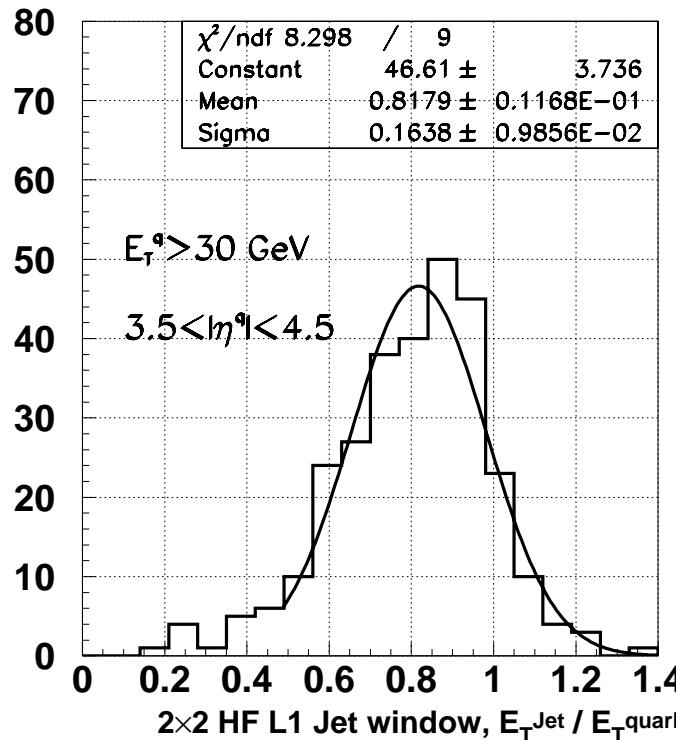


HF Trigger tower
is 1x1 off-line tower

HF Trigger tower
is 2x2 off-line towers



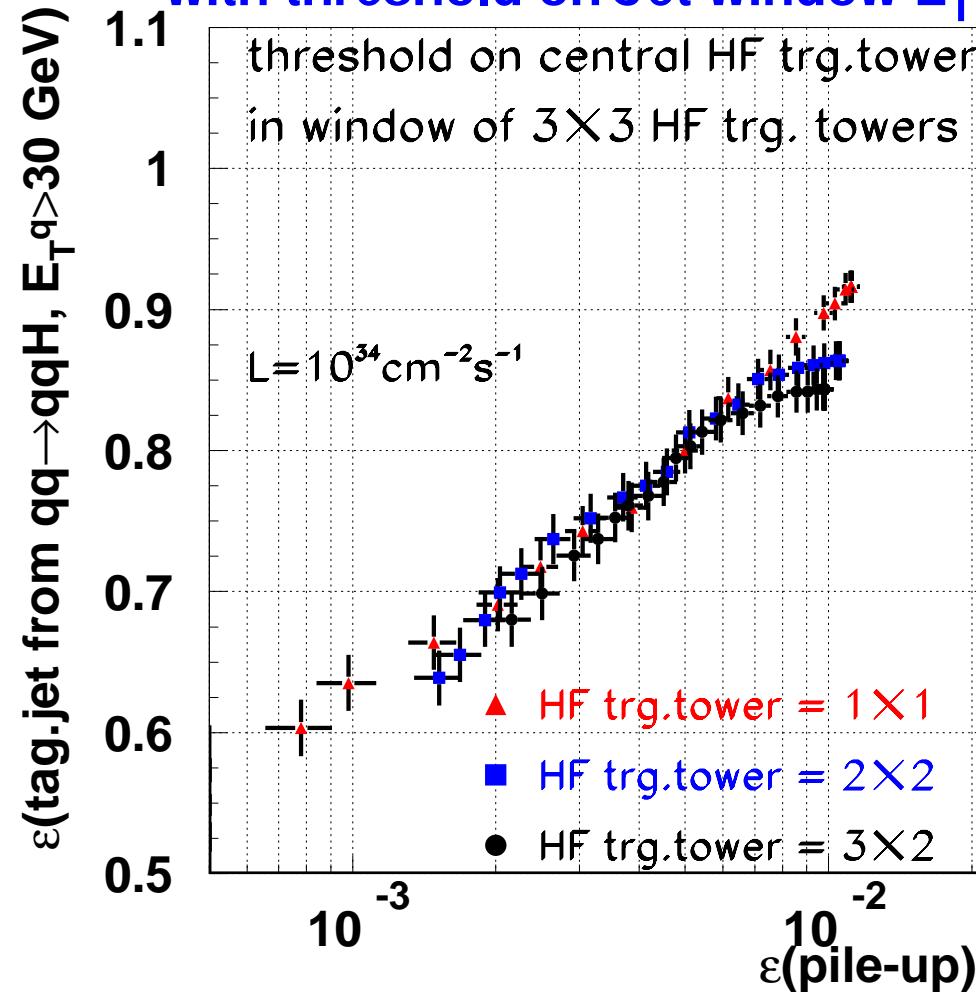
HF Trigger tower
is 2x3 off-line towers



ADDITIONAL OLD PLOTS FROM THE PREVIOUS TALK

L1 jet shape information and pile-up jet rejection v.s. efficiency (I)

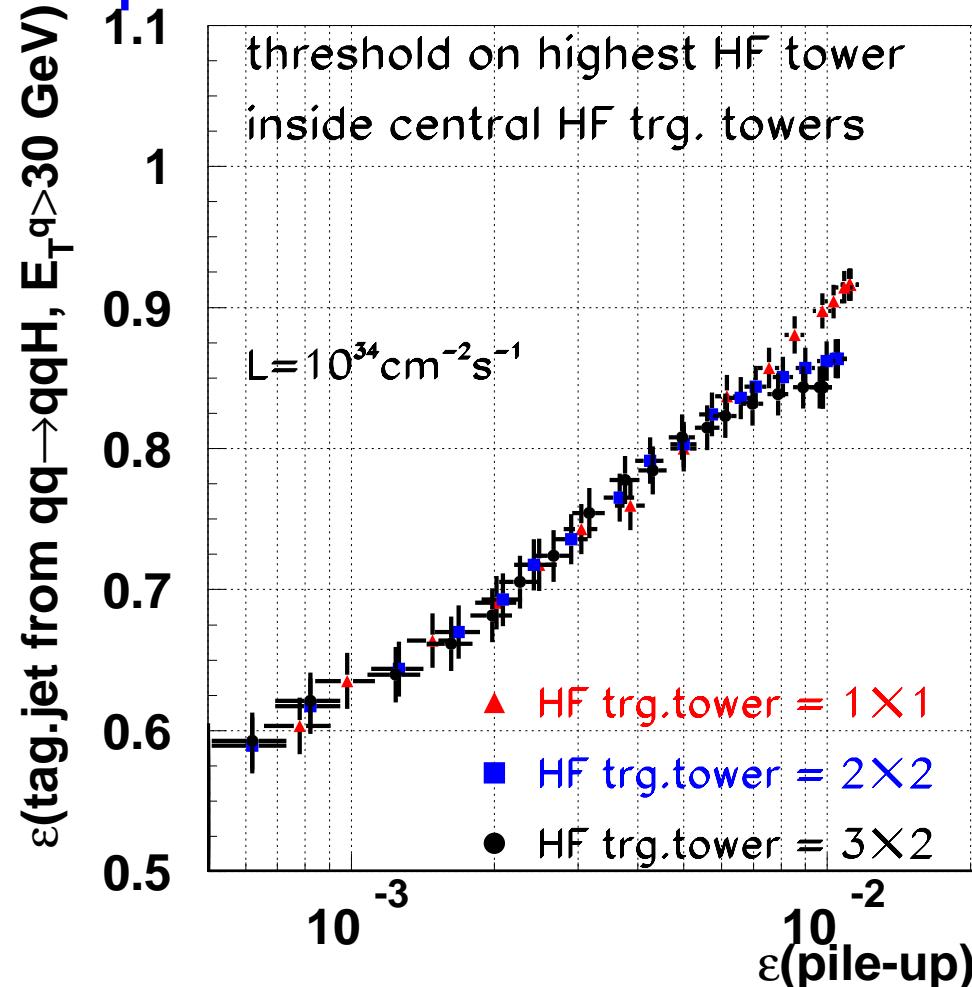
cutoff on central trigger tower after suppression ~ 100
with threshold on Jet window E_T



there is no difference

L1 jet shape information and pile-up jet rejection v.s. efficiency (II)

cutoff on highest E_T tower inside central trigger tower
after suppression ~ 100 with threshold on Jet window E_T



there is no difference

Do we need shape variable ?

solid line contour -
 $\epsilon(\text{pile-up}) = 100$

dashed line contour -
 $\epsilon(\text{pile-up}) = 500$

numbers -
 $\epsilon(\text{tag.jet})$ for
 $\epsilon(\text{pile-up}) = 100$

Combined cut on E_T
of central tower and
jet window is
more effective

